Design for All as Focus in European ICT Teaching and Training Activities

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Abstract

Both in the EU and UK the goal of digital inclusion demands a broad understanding of the factors that contribute to the risk of exclusion such as a result of age, disability, low literacy, geography and ethnicity. The overall methodologies and principles of Design for All are well established and address many of the challenges of design for user diversity including older and disabled people, however these are not yet an established part of the curriculum in mainstream Computing and Information and Communications Technology (ICT) in higher levels education.

The Design for All @eInclusion project investigated the current provision of education and training of future developers and associated disciplines and identified both progress and gaps. Best practice included examples of specialist modules and what we termed 'hidden gems' – instances of small elements such as single lectures that are optional, integrated or embedded within a more substantial module. These findings have contributed to the on-going development of curriculum guidelines which take account of the latest agreements for European harmonisation through the European Qualifications Framework. These curriculum guidelines will make use of student centred learning outcomes and are intended to stimulate the creation of new courses throughout Europe.

Keywords

Information and Communication Technologies (ICT), Design for All, Teaching, Training, Learning Outcomes

Introduction

The successful implementation of European digital and eInclusion policies calls for a widespread understanding of the principles, practicalities, methodologies, strategies and processes of Design for All (DFA) by the future designers and developers of information and communications technologies (ICT) [1]. These technologies support the delivery of services accessed through personal computers, handheld and mobile devices, digital tv and mobile phones which deliver information through the internet, and other services such as the next generation of ambient intelligent devices. The essential goal of Design for All is one of human rights and equality of access and in particular that goods and services can be designed so that they:

'Design for All as Focus in European ICT Teaching and Training Activities.' by Keith, S., Whitney G., Petz, A., and published in the INCLUDE 2009 Proceedings ISBN: 9781905000807, pp 1-6

"…can be accessed by nearly all potential users without modification or, failing that, should be easy to adapt according to different needs, or should use standardised interfaces that can be accessed by using assistive technology…" [1].

The European Commission has committed to promoting eInclusion within the Information Society for the benefit of all citizens:
“ICT has great potential to enhance social inclusion and cohesion by empowering all Europeans to fully participate in and contribute to the economy and society.”[2].

Future ICT professionals and technicians will need to receive appropriate training to enable them to develop the skills necessary to interact with industry and government and with representative user groups and to design suitable (useful, usable and accessible) ICT products. There are however serious gaps in the provision of this specialist information within university level courses and professional skills training. Within this paper we report on our actions to identify the current state of provision within the EU and the opportunities to develop an agreed, more substantive curriculum.

We report on the results of our activities to identify, track and evaluate instances of Design for All courses or course elements within mainstream higher level education in ICT, design and engineering and briefly examine key themes of best practice.

This work has been carried out by the partners of the “Design for All @ eInclusion” (DFAEI) project which is a Sixth European Framework Programme IST Coordination Action. The project partners represent 23 countries within Europe and each partner is recognised as a national expert by the European Design for All eAccessibility Network (EDeAN). The project activities include the development of curriculum guidelines and an online information resource, and the development of links with educational institutions and industry (see: www.edean.org)

State of the art and previous work

The IDCnet project published a taxonomy of the core knowledge and skills to raise awareness of the need for the Design for All approach [3]. This taxonomy identified generic aspects of Design for All such as awareness, legislation and design guidelines and ICT specific topics included accessible interaction, accessible content, user centred design and provision for e-learning and new paradigms such as ambient intelligence.

There is some indication of activity in developing courses with a Design for All focus, for example Matausch, Hengstberger and Miesenberger (2006) [4] describe the creation of a course and the effect on the graduates, including a description of the new fields of work that the graduates can work in due to their combined knowledge of user needs and technology. However, Weber and Abascal (2006) stated explicitly that:

> "there is not enough teaching material available to help students...learn how to identify which design decisions…have an impact on a particular group of users." [5]

Design for All in ICT around Europe

The first part of our study was to determine whether the work of IDCnet had been adopted and whether there was evidence of these design principles being included in ICT teaching. All the project partners and associated members of EDeAN were emailed with a request to seek out appropriate training facilities within their own institutions and other teaching centres where DFA content might be included, for example within computing science, web design or multimedia programmes.

The initial responses to our survey revealed very limited success in identifying whole programmes having Design for All or related titles in Universal or Inclusive design. However some responses revealed instances of small elements within courses on computing, human computer interaction, web applications and information systems, or within programmes on disability and rehabilitation. A request was made to ask the partners to seek out further examples of similar small elements of DFAcontent

This resulted in a final pool of 50 courses having some DFA relevant content. The analysis that follows offers a snap-shot of current practices in teaching DFA in ICT and an indication of the diversity of teaching practice across Europe. In particular, differences occur between study programmes where the student follows a pre-defined curriculum or where the student chooses modules and seminars which are offered to both undergraduate and postgraduate courses. This diversity of practice revealed by the initial survey was used to inform the selection of case studies on best practice.

The results of the survey

Responses were received from thirty-five course providers in 18 countries of the 22 partner countries. From the UK, information was received about 12 courses, Germany 11, Austria 7 and Finland 3. One or two courses were identified in: Greece, Norway, Belgium, Hungary, Portugal, Czech Republic, Ireland, Slovakia, Denmark, Italy, Slovenia, Spain, Malta and Sweden. We did not receive any submissions from The Netherlands, Estonia, Lithuania or France.

The IDCnet deliverable [3] was used to create a list of core topics in DFA content and respondents were asked to indicate which of these topics were included in their course. Data on course content was given for 44 courses. As shown in Table 2 almost all (over 80%) reported that courses delivered general information on design for all awareness, recommendations and principles.

Specialist ICT topics such accessible interaction and user centred design were also offered by almost all courses (over 80%). Accessible content or and new paradigms of interaction were offered by more than half the courses and this probably reflects a difference in specialisation between internet applications and other ICT technologies.

Information about the course level was provided from 47 of the courses and included 18 courses at undergraduate bachelor level and 12 at professional or Masters degree. A further 11 courses were described as mixed and available to students following either an undergraduate or masters programme and 5 were described as vocational.

Table 1: Summary of responses to course topics

Course content by topic	No.of courses including this topic (n=44)	% of courses including topic
Why Design for All: Ethical Considerations, Compliance with legislation, commercial potential, etc.	40	91%
Design for All Awareness: What is Design for All?	38	86%
Recommendations: Principles, Guidelines, Standards, Best Practice, etc.	38	86%
Accessible Interaction: Input & output (e.g. hardware and software enablement of interaction, including assistive and adaptive technologies, alternative modalities, etc.)	38	86%
User Centered Design	37	84%
Accessible Content: Knowledge of accessible content and multimedia	29	66%
New Paradigms of Interaction, Applications and Research (e.g. pervasive and/or mobile computing, ambient intelligence, convergence, etc.)	28	64%

Best practice in teaching and training

The spread of courses with respect to content and level revealed some of the diversity of current practice and a set of case studies was chosen for further analysis. The selected case studies represented differences in national educational practices around Europe and differences in the scope and focus of teaching activity. We consider here some of the key themes raised.

Collaboration between educators

Collaboration between national universities was found to have helped establish teaching programmes on Design for All. Previously in Greece (2003-2005), a number of training activities in ICT and DFA were run in the context of the national project “Eftehnos”. The project aimed to develop a human network among academic/research partners, companies and organizations of persons with disabilities, aiming at promoting awareness and proficiency of the scientific, research and business environment to the use of supportive technologies. This was accomplished though educational programs, which presented methods and techniques for the application of new information technologies for people with disabilities. The target group of these educational programs

were post-graduate students, executives, and graduate students having a related background. (http://www.di.uoa.gr/speech/eftehnos/ in Greek only).

Opportunities for technology enhancement

In Austria, students are encouraged to enhance their studies with small optional courses or seminars. Students chose to follow a proportion of elective courses that add to a broad understanding of their chosen programme in computing science, economics, statistics or engineering or similar. The Seminar in Pervasive Computing for example is one of several short courses offered and the students may be either at an equivalent Bachelor or Masters level and provided an opportunity to understand issues of accessibility.

Practical applications

Engaging students in practical applications was reported as having a significant impact on the student. In Spain, students studying for a degree in Computing or a Masters in Information Technology had to develop an accessible website that conformed to guidelines on accessibility. In Germany students studying for a Masters in Media Informatics also have a practical project. The module covers issues of accessibility with a focus on building complex on-line applications. Students are expected to have pre-requisite skills in for example Java, XML, HTML and CSS and to complete a practical project.

Other popular teaching techniques included the use of videos, U-tube clips or talks by people with disabilities to demonstrate the use of ICT to facilitate everyday activities or game playing and which helped to engage the students and stimulate discussion.

Hidden gems

In many instances design for all issues were addressed as a small element within a mainstream course. For example students at the Czech Technical University following a compulsory module in Computer Graphics had just 4 lectures and seminars which focused on accessible interaction and user centred design. In a university in Norway it was reported that Design for All was an integrated theme for students in Engineering and that awareness of social responsibility was introduced in the first year.

Learning outcomes and proposed harmonisation

The case studies were asked to describe their teaching activities in more detail including defining student centred learning outcomes; however we found that the use of learning outcomes was not common practice outside of the UK.

A number of the case study respondents reported on actions to meet the Bologna agreement to harmonise education at higher level education in order to support comparability of qualifications and mobility of the workforce. This is resulting in the restructuring of undergraduate programmes and the introduction of new Masters level programmes. The publication of the European Qualifications Framework (2008) has

helped to define what is expected of the students at different levels of higher education, and makes use of student centred learning outcomes to support comparison [7].

Conclusions

Change is needed in higher level ICT education to address the increasingly social, economic and political contexts in which technology is used. The promotion within the European Union of the ideals and benefits of eInclusion will depend on students throughout Europe developing knowledge and skills to create and design accessible and inclusive systems. ICT exists in a global market and these courses need to be harmonised across Europe and the current harmonisation programme may prove beneficial to this objective. The DFAEI project will continue its work on content, teaching technique and student centred learning outcomes in order to develop curriculum guidelines that can be used to initiate new programmes, modules or integrated elements according to local requirements and opportunities. We will also continue on a mission to ensure that we promote inclusive learning experiences and use of accessible eLearning environments in order to offer inclusive access to all students.

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